

HOW WE CAME TO HAVE THE SLOCOMB SHOP MICROMETER

BY J. T. SLOCOMB*

Luther D. Burlingame, writing in the June number of *MACHINERY*, undertakes to tell "How We Came to Have the Micrometer Caliper," but when he finally sums up at the end of his article he shows a diagram of the Brown & Sharpe micrometer and the article is really "How We Came to Have the Brown & Sharpe Micrometer." To avoid such criticism, I will call this, "How We Came to Have the Slocomb Micrometer."

The principle of the micrometer is very old. The particular reading as commonly used on the sleeve and thimble, as far as I know, came from the Palmer patent. Mr. Burlingame says that I gave the impression that micrometer calipers were not used extensively during the period between 1885 and 1890. This is the impression that I meant to convey, and I think is well borne out by facts. We will admit that Mr. Sharpe brought from France in 1867 a Palmer micrometer, but it was in 1877—or ten years later—that they made their first one-inch micrometer, which goes to show that his conception of the value of the micrometer for machine shop purposes was not great.

Horace Thurston, who had charge of the tool department at the Brown & Sharpe works, writes as follows: "I severed my connection with the Brown & Sharpe Mfg. Co. July, 1882. Up to that time the micrometer was in very little use, there being only two or three in the entire plant, I being the owner of one."

Henry Corp who was employed on the third floor where they made sewing machines and other small work and where I should expect to find micrometers in use, if anywhere, says, "I regret to say that I cannot give you any accurate information on that subject as I was at work on the third floor where there would not be much use for micrometers."

Charles Corp, Edward Parks and George Greene, who worked at the Brown & Sharpe plant at the time I was there, agree with me that micrometers were very little used and that perhaps half the men owned one-inch micrometers, but as far as they knew, there was not a two-inch tool in use anywhere except the one that belonged to Mr. Burnham and that I referred to in the article in the December number.

I have a letter from Thomas Craig in which he says, "I commenced work for the B. & S. Mfg. Co. Thursday, December 6, 1877, at 1 P. M. As near as I can remember they had just a few one-inch micrometers in use in the shop. Some time about 1880 they started to make a lot of fifty one-inch micrometers. They gave the contract to a fly-by-night machinist by the name of Smith, but he flew before the contract was finished. I can't remember fully who finished them—I do know that one of them was in the tool-room when I took charge. It was only partly finished, so out of it I made the first thread micrometer that was ever made, and it was in use in and out of the tool-room for many years before any were made for sale.

"Did I ever tell you of the joke that I played on George Richard, the inspector, with this old thread micrometer? You see I was the only one who knew how to read it, so once upon a time I was requested to make personally two studs somewhat like the enclosed sketch. The $\frac{1}{2}$ by 13 thread I was told must be just standard, so I got all the parts the same as the sketch except the thread. I got the thread on the first one that I cut 0.001 inch small, so I made the other just the same; when they came to George for inspection he went to the tool-room for the thread micrometers and, of course, he had to come to me to tell him how to read them, so you can see the joke. They passed inspection O. K. I am very sure that Brown & Sharpe did not make any two-inch micrometers before Mr. Spalding came there from the Victor Sewing Machine Co. I think that the first one we ever had was a Victor—just when we got it I don't remember, but think it was somewhere about the time that you say—1884 or 1885."

I have lately visited A. W. Handy in Portland, Me. Mr.

Handy worked for the Brown & Sharpe Mfg. Co., beginning in 1862 and leaving in 1880. He built many of the B. & S. machine tools by contract. He told me that while he was in the company's employ few micrometers were made, and these were made to fill orders, being used principally by the brass manufacturers in Connecticut for measuring sheet brass. The design apparently was something between the Palmer and a suggestion made by the brass manufacturers. Mr. Handy said that micrometers were not used then for machine shop purposes. Before the Victor Sewing Machine Co. was bought out by the Brown & Sharpe Mfg. Co., the latter made micrometers with a diagonal revolution line on the sleeve, so cut as to correct inaccuracy of the pitch of the screw; but with the goods purchased from the Victor Sewing Machine Co. there was a precision screw made by the Pratt & Whitney Co., Hartford, Conn., and this was afterwards used for making accurate micrometer screws.

The first micrometer I ever saw was one made by A. J. Wilkinson at Hyde Park, Mass. This was in 1884. It was a one-inch caliper and had a covered screw. Mr. Wilkinson was making them in a factory devoted to dental instruments. The machinist who showed me this caliper said, "It is a useful tool to gage wire with," and I believe that he expressed the general opinion of micrometers at that time. They were not machine shop measuring instruments.

During my stay in the Brown & Sharpe works—from 1885 to 1890—I thought I saw the possibility of micrometer calipers, although I did not at that time contemplate going into business. In 1893 I was in business and was looking about for something to manufacture. It occurred to me that the micrometer was something that could be developed into a valuable machine shop tool. I had had a good deal of experience in machine shops and thought I knew how to design a micrometer to cover machine shop requirements. It was practically the same problem as taking a lathe that was used for experimental purposes and improving upon it or redesigning it for heavy-duty machine shop service.

Perhaps there have been few tools gotten out that have been so much misunderstood as the Slocomb micrometer. Because we left off some of the metal polish on the frame, people thought this part cast iron and formed the impression that the rest of the tool was in keeping with it. A well-known maker of machine tools a good many years ago made screw machines with the bed planed and polished all over. The rest of the machine was of a type common to that period with short and small bearings and weak drive, and was what would be called today generally inefficient.

Now as a comparison with Slocomb micrometers, suppose at that time some one had designed a screw machine with all the modern features but left off the polish on the bed; would this new machine have been considered cheap or inferior? This was exactly the case with the Slocomb micrometer. I designed a form of bearing nuts that increased surface of thread contact about four times over what was common without increasing the size or weight materially. I put in an all tool steel screw considerably larger in diameter than the regular one without increasing the outside diameter of the tool materially. I put in a solid anvil and an improved form of adjustment that made these parts more substantial and more easily adjusted. I put a spring between the nuts arranged in such a way that there is a slight uniform friction throughout the range of the screw regardless of the wear of parts. This spring tension allows the micrometer to be screwed down upon the work, taken off and the measurement read without danger of the screw's turning of its own accord. I designed a new style of I-beam frame, providing for the greatest stiffness without increasing the weight. Altogether, I designed what others call now the heavy-type micrometer, but what I call the high-duty Slocomb micrometer, and put this into such shape that it is accurate, easy to handle, very durable and moderate in price. It is evident that this I-beam frame could not well be finished in bright metal. I could have sand-blasted and nickel-plated them, but nickel-plate was in disrepute in machine shops. The black enamel is a non-conductor of heat and for other reasons seemed the most appropriate finish.

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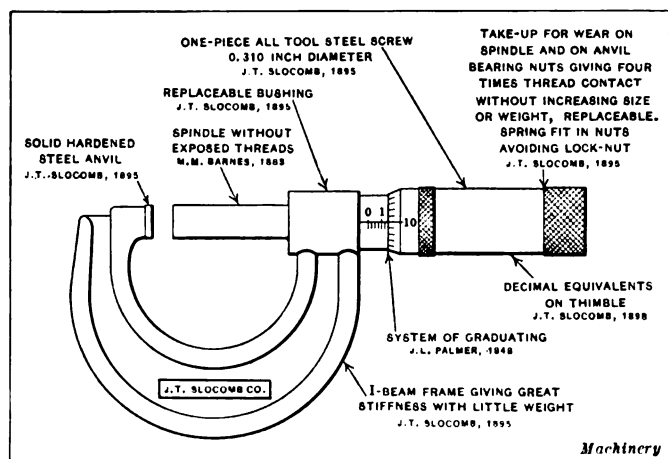
In 1894 I made a precision screw and designed and constructed a special lathe so made that the accuracy of this screw is surely duplicated in the work. The trouble in doing this with regular lathes is that the lead-screw is too far off one side of the cutting tool so that any irregularities in the smoothness of carriage is manifested in inaccurate work. With this new lathe and new large precision screw, I was able to cut accurate threads on tool steel, something that no one else has been able to do commercially so far as I know. This accurate tool steel screw was the greatest boost the micrometer ever had for machine shop requirements.

Mr. Burlingame mentions my design patent April 13, 1897, which covers the design of frame, but has neglected to mention my other patent which covers the important part of the construction. The screw thread micrometer referred to in Mr. Burlingame's article which he says Mr. Hiscox showed Mr. Whitehead is probably the micrometer referred to in Mr. Craig's letter.

Many attempts have been made to make micrometers with more than one-inch range of measurement. This I have always contended is on the wrong track. In a shop of more than one-man power, more than one micrometer is necessary and they may as well be of different sizes. A micrometer with attachments is unreliable. A micrometer of two- or three-inch capacity is too heavy to use on small work, and if well made a combination micrometer would cost as much as several separate tools. A set of micrometers will last longer than one and there are several other reasons for having the one-inch range only.

Mr. Burlingame says, "To illustrate from how many sources the features of the present-day micrometers have been derived, reference may be made to Fig. 25, where some of these features together with their inventors are indicated." The illustration referred to shows the Brown & Sharpe micrometer and ignores all others. According to my opinion of the requirements of a first-class micrometer, the diagram should be as shown in the accompanying illustration.

The locking device referred to by Mr. Burlingame is a device which converts the micrometer caliper into a snap



Improvements in Micrometer Caliper made by J. T. Slocomb and others

gage. When used it destroys the best feature of the micrometer, and I cannot admit that it is a valuable improvement to the micrometer caliper.

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One of our contemporaries advises its readers that the Canadian public has been warned by its government against dealing with German or Austrian firms, because this is an offense punishable by three to seven years of penal servitude. It is further mentioned that certain firms in the United States have been attempting to sell in Canada various lines of German or Austrian goods, in this case, paper and paper specialties, as well as a wide range of other goods, and that the department of customs in Canada has issued stringent instructions to custom officers to be on the lookout for goods of this character, and that all German-made goods that pass the international boundary will be confiscated.